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## TITLE OF THE INVENTION

### PACKAGING DEVICE FOR A FLUID PRODUCT

#### CROSS-REFERENCE TO RELATED APPLICATIONS:

**[0001]** This document claims priority to French Application Number 02 15286, filed December 4, 2002, and U.S. Provisional Application Number 60/441,486, filed January 22, 2003, the entire contents of which are hereby incorporated by reference.

#### FIELD OF THE INVENTION

**[0002]** The invention relates to a packaging device for a fluid product. The invention can be particularly advantageous for a liquid or viscous product such as may be found in the fields of cosmetics, paints or adhesives. More particularly, the invention can be advantageous in the field of cosmetics, with the product, for example, a nail varnish or nail polish composition or other nail care product.

#### BACKGROUND OF THE INVENTION

##### DISCUSSION OF BACKGROUND

**[0003]** Generally, a nail varnish or polish applicator set includes a reservoir for the product to be applied and a product applicator, such as a brush with a tuft of bristles attached to a first extremity of a rod. The rod is fixed at its other extremity in a cap intended to close the reservoir so that the tuft of bristles is immersed in the product when the applicator set is closed.

**[0004]** To ensure efficient closure of the unit, the reservoir includes a neck incorporating a first screw thread which engages with a second screw thread provided in the cap. The cap includes a transverse wall which is in contact with the upper edge of the neck when the applicator set is closed. The screw thread is formed over the full height of the neck and is flush with the upper extremity of the neck.

**[0005]** In this type of packaging, the neck opening is sufficiently large such that when the reservoir is in the open position the product is able to flow out of the reservoir if the reservoir is overturned.

**[0006]** Furthermore, to apply the product to the nail, the applicator impregnated with product is withdrawn from the reservoir. Generally, the brush carries an excess amount of

product. It is therefore necessary to remove this excess product, and in order to do this the user strips the brush by wiping it on the end of the reservoir neck. The product may then remain on the neck and run along the external wall of the neck, thereby fouling the screw thread on the neck. When the cap is screwed back on to close the reservoir, the product is then spread over the neck and into the screw thread. The product then dries, thus forming a build-up on the cap/neck assembly. During subsequent use it becomes difficult, or even impossible, to unscrew the cap from the reservoir. Moreover, the product present on the neck prevents effective sealing of the applicator unit because the cap is no longer in leaktight contact with the upper edge of the neck.

**[0007]** To avoid having to wipe the brush on the rim of the neck, it is possible for example to use a stripper element mounted inside the neck as described in document GB 683,932. In this document, the stripper element is composed of a tubular element terminating in a tapered portion which converges towards flexible lips. The flexible lips define an opening having a diameter less than or equal to that of the stem of the brush. When the cap is opened, the brush is stripped by the stripping lips and the user no longer needs to wipe the brush on the rim of the neck. In this device, the stripper element includes a flange which bears against the upper extremity of the neck. This is also the case with the stripper element described in US patent 5,284,239.

**[0008]** US patent 5,961,238 also describes a stripper element mounted inside the neck of a reservoir. The stripper element incorporates a flange bearing not on the upper extremity of the neck but in an indentation provided inside the neck. However, the flange of the stripper element projects slightly beyond the upper extremity of the neck.

**[0009]** In the devices described in these two documents, the cap bears in a leaktight manner on the flange of the stripper element. When the brush is withdrawn from the reservoir, product can be deposited around the neck opening, and therefore onto the flange of the stripper element, so that when the cap is reclosed the product can cause the stripper element to stick to the cap as it dries. At the next opening, the stripper element can tend to remain stuck to the cap and to come out of the neck or at least be displaced inside the latter.

## SUMMARY OF THE INVENTION

**[0010]** It is an object of the invention to provide a packaging device for a fluid product which does not present the drawbacks of the prior art.

**[0011]** It is another object of the invention to provide a packaging device which reduces the risk of the product running out of the reservoir, particularly when the device is accidentally overturned.

**[0012]** A further object of the invention is to provide a packaging device which makes it possible to limit and/or regulate the quantity of product on the applicator while at the same time avoiding fouling of the reservoir neck.

**[0013]** It is also an object of the invention to provide a packaging device which makes it possible to reduce evaporation of the product contained in the reservoir.

**[0014]** A still further object of the invention is to provide a packaging device which includes a reducer securely retained inside the device.

**[0015]** It is yet another object of the invention to provide a packaging device which incorporates a reducer that does not deteriorate over time.

**[0016]** According to the invention, these objects can be achieved by a packaging device for a fluid product which includes a bottle formed by a body surmounted by a neck with an axis X having an opening. In the illustrated preferred embodiment, the opening is defined by a rim which includes an inner portion and an outer portion, with at least part of the outer portion located axially above the inner portion. A flow reducer is mounted in the neck opening. The reducer has a flange bearing on the inner portion of the rim of the neck. The flange of the reducer extends to a non-zero axial distance from at least a part of the outer portion of the rim and is located axially between the inner and outer portions of the neck rim. By having the flange of the reducer spaced a non-zero distance from at least part of the outer portion of the rim, the cap can contact the outer portion of the rim without having to contact the flange to thereby reduce the possibility of the reducer becoming coupled to the rim and displaced or loosened upon removal of the cap. The flange can overlie at least part of the inner portion of the rim and can be positioned such that it does not contact the cap when the cap is mounted on the container.

**[0017]** When a bottle of this kind is closed in a leaktight manner by a cap, the cap bears in a leaktight manner on the outer portion of the rim without coming into contact with the reducer which is set back. Thus, even if the product runs onto the flange of the reducer, the clearance between the flange of the reducer and the cap is sufficient to prevent these two components from sticking together, and therefore to prevent the reducer from being pulled out of the neck when the cap is removed. Retention of the reducer in the neck is thus improved. In addition, when the cap is closed, because the sealing action is obtained by engagement of the cap with a portion of the bottle neck and not with the reducer, the bottle is

configured so as to be capable of use both with and without a reducer. Also, as the cap is not in contact with the reducer, the latter is not subjected to axial stresses from the cap, reducing the possibility of stress cracking.

**[0018]** The reducer restricts the opening of the bottle, thereby also reducing the risk of accidental spillage or at least reducing the amount of spillage if the bottle is in a non-upright position such as when the bottle is overturned or turned on its side. Evaporation of the product is also reduced, so that the product dries less rapidly inside the bottle when the bottle is open. In addition, the presence of the reducer has the effect of stripping part of the product from the applicator when it is withdrawn from the bottle. This dispenses in particular with the need for the user to wipe the applicator on the neck of the bottle, while leaving sufficient product on the applicator, to cover at least one nail for example.

**[0019]** The reducer can include a free end which, with the reducer mounted in the bottle, is located at a non-zero distance, measured transversely relative to the axis X, from the walls of the bottle. A space is thus created between the bottle and the reducer which prevents the product from running into the passage defined by the reducer. In a disclosed example, the product can remain in the annular space or volume formed around the reducer. The risk of accidental spillage of product from the bottle is thus further reduced.

**[0020]** In accordance with a disclosed preferred example, the transverse cross-section of the outer wall of the reducer can be circular and diminish towards its free end so as to form a tapered portion. A shape of this kind facilitates insertion of the reducer into the neck of the bottle.

**[0021]** The reducer can be retained by a force fit inside the neck of the bottle. In accordance with one example, ribs on the outer surface of the reducer are provided in order to compensate for any surface irregularities on the inner wall of the bottle, particularly when the latter is made of glass.

**[0022]** The reducer can be made by molding a thermoplastic material from a single piece. The material can be chosen, for example, from among the polyvinyl chlorides, polypropylenes, polyethylenes, polystyrenes, or a composite of materials of the polypropylene/ethylene-vinyl-alcohol(EVOH)/polypropylene, polyethylene / polyethylene terephthalate, or polystyrene/EVOH/polyethylene type materials.

**[0023]** The device can include a removably mountable cap to close the neck opening in a leaktight manner with respect to the product, such that an inner wall of the cap bears on part of the outer portion of the rim when the cap is mounted in a closed position.

**[0024]** The cap can include a screw thread on its inner wall designed to engage with a counterpart screw thread provided on the outer wall of the bottle neck.

**[0025]** The cap may be integral with an applicator, in particular a brush which can be configured to apply a nail varnish or polish.

**[0026]** The bottle can, for example, be made of glass. The invention is particularly advantageous for use in containers of cosmetic products, and more particularly for nail products such as a nail varnish or polish.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0027]** Other characteristics and advantages of the invention will become apparent from the following detailed description, particularly when considered in conjunction with the drawings in which:

**[0028]** Figure 1 illustrates an exploded perspective view of an embodiment of a packaging device according to the invention; and

**[0029]** Figure 2 shows a partial cross-section of the device illustrated in figure 1 in the closed position.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0030]** The packaging device shown in figures 1 and 2 includes a bottle 10 formed by a body 11 and a neck 12 having a longitudinal axis X, and a cap 30 to close the bottle. The bottle is made of glass, for example. The invention is particularly advantageous for containers that contain, for example, a liquid product. In a particularly preferred form, the container contains a cosmetic product, more preferably a nail care product such as a nail polish or varnish.

**[0031]** According to the example illustrated, the body 11 of the bottle 10 is cylindrical in shape and includes a shoulder 16 having the neck 12 extending thereabove. The neck 12 incorporates a screw thread 15 on its outer wall designed to engage with a counterpart screw thread 32 provided on the inner surface of the closure cap 30. The neck terminates at a rim 14 which defines an opening 13 in the bottle. The neck includes a radial indentation 140 on its inner wall in proximity to its upper extremity which forms an inner annular portion of the rim. Above this indentation, the rim can have an outer annular portion 141 fitted with a seal or seal portion. In the illustrated embodiment, the rim includes a sealing ring on which an inner wall 31 of the cap 30 is intended to bear when the cap is in the closed position. It is to

be understood that the outer annular portion 141 need not be fitted with a seal. In the latter case, the cap 30 can bear on the entirety of the outer annular portion 141 of the rim.

**[0032]** The cap 30 includes a skirt 33 closed by a transverse wall 34 integral with an applicator 40. The applicator is, for example, formed by a rod 41 at the end of which is attached a tuft of bristles 42 forming a brush. It is evident that any other applicator can be used in place of the tuft of bristles, including but not limited to a flock tip, a foam tip, a spatula of flexible material, etc.

**[0033]** A flow reducer 20 is mounted in the neck opening. The reducer is made, for example, by molding a thermoplastic material in one piece. Although not to be construed as limiting, preferred examples of materials that can be used for the reducer include polypropylene or polyethylene.

**[0034]** The reducer is formed by a tubular element 24 which terminates at its upper extremity in a flange 21 extending radially outward. The transverse cross-section of the reducer decreases slightly towards a free end 22 opposite to the flange 21, so as to form a tapered portion 25. A shape of this kind facilitates insertion of the reducer into the neck 12. The reducer 20 is held by a force fit inside the neck of the bottle. In the illustrated embodiment, the reducer includes annular ribs 23 on its outer surface enabling it to remain radially constrained by the neck of the bottle at all times, even if there should be some unevenness in the surface of the inner wall of the glass bottle.

**[0035]** The free end 22 of the reducer is located a non-zero distance, measured transversely relative to the axis X, from the walls of the bottle. An annular space 26 or volume is thus created between the bottle and the reducer which prevents the product from running into the passage defined by the reducer. In fact, when the bottle is turned upside down, the product flows by gravity along the inner walls of the bottle and tends to follow these walls so that the product will remain in the annular space formed around the reducer and will not tend to run into the reducer.

**[0036]** The flange 21 of the reducer bears on the inner annular portion 140 of the neck rim. In the arrangement shown, the flange 21 extends a non-zero distance over at least part of the inner portion of the rim. In the preferred embodiment illustrated, the flange is also positioned such that it extends to a non-zero axial distance from at least a part of the outer annular portion 141 of the rim, i.e., the seal. In the preferred example illustrated, the entirety of the top of the flange 21 is located at a non-zero axial distance from the entirety of the outer annular portion 141 of the rim so as to form an axial clearance between the topmost part of the flange 21 and the lowest part of the outer annular portion 141 of the rim. In the illustrated

example, this can be achieved by having the inner portion of the rim recessed from the outer portion of the rim by an amount greater than the thickness of the flange of the reducer as shown. In the event that the outer annular portion 141 of the rim does not include a seal and is formed only by a plane annular surface, the entire flange 21 is preferably located at a non-zero axial distance from this plane surface. Thus, the flange can be spaced a non-zero distance (preferably a non-zero axial distance) from at least part of the outer portion of the rim. With this arrangement, it is possible to have the cap contact the outer portion of the rim without contacting the flange when the cap is mounted on the container. The flange can extend to overlies at least a portion of inner portion of the rim and this feature can also allow the cap to contact an outer portion of the rim without contacting the reducer.

**[0037]** The reducer serves in particular to restrict the passage formed inside the neck to prevent the product from running out of the bottle in the event the bottle is turned on its side or turned over. In addition, by selecting its internal diameter as a function of that of the applicator, the reducer can be used to strip the applicator 40 as it is withdrawn from the bottle in order to remove the excess product before use. The quantity of product taken up by the applicator each time it is withdrawn from the bottle is thus regulated.

**[0038]** Figure 2 illustrates the cap in the closed position, with the cap screwed onto the bottle by the engagement of screw threads 32 and 15, and the brush is seated inside the bottle and immersed in the product. In this closed position, the inner surface 31 of the transverse wall 34 of the cap bears in a leaktight manner on a part of the outer annular portion 141 of the neck rim, e.g., on the sealing ring or seal portion associated with the rim. In this position, there is no contact between the cap and the reducer by virtue of the presence of the axial clearance formed between the flange 21 of the reducer and the outer annular portion 141. There is therefore little risk that any product remaining for example on the flange 21 of the reducer from a previous use will cause the cap to stick to the reducer as it dries. This prevents the reducer from being pulled out when the cap is unscrewed. As shown in Figure 2, by advantageously positioning the flange of the reducer with respect to the cap and the rim of the bottle, for example, by positioning the reducer flange in a recessed inner portion of the rim as shown, the cap can contact the outer or topmost portion of the rim 141 without the cap contacting the flange of the reducer. In the preferred form, the relationship of the reducer flange and the container rim with respect to the cap are provided by the recess as shown, however, it is to be understood in light of the teachings herein that other positioning expedients could be utilized to accomplish the provision of contact between a top portion of

the container rim without contacting the top of the reducer. In addition, although a generally cylindrical container is shown, it is to be understood that other container shapes are possible.

**[0039]** The bottle and cap described above may be used with a reducer, for example, such as that described above, but also without a reducer, in which case the sealing action is effected on the bottle and not on the reducer when the cap is closed. This makes it possible in particular to manufacture bottle-and-cap sets with or without a reducer on the same industrial production line and with the same packaging components.

**[0040]** Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.